



# City of Redmond 2003 WSEC & VIAQ Residential<sup>0,1</sup> Prescriptive Compliance Form

If you have chosen to follow the prescriptive insulation and glazing requirements you will need to choose one of the five options below. This choice may depend on your glazing percentage (the total area of glass in the heated areas of the building divided by the total floor area of the heated space.)

**Check the box in front of the option which you will use to meet the prescriptive requirements:**

Choice	Option	Glazing Area <sup>10</sup> : % of Floor	Glazing U-Factor		Door <sup>9</sup> U-Factor	Ceiling <sup>2</sup>	Vaulted Ceiling <sup>3</sup>	Wall <sup>12</sup> Above Grade	Wall• int <sup>4</sup> Below Grade	Wall• ext <sup>4</sup> Below Grade	Floor <sup>5</sup>	Slab <sup>6</sup> on Grade
			Vertical	Overhead <sup>11</sup>								
	I.*	12%	0.35	0.58	0.20	R-38	R-30	R-15	R-15	R-10	R-30	R-10
	II.*	15%	0.40	0.58	0.20	R-38	R-30	R-21	R-21	R-10	R-30	R-10
	III.*	25% Group R-1 and R-2 Occupancies Only	0.40	0.58	0.20	R-38 / U = 0.031	R-30 / U = 0.034	R-21 / U = 0.060	R-15	R-10	R-30 / U = 0.029	R-10
	IV.	Unlimited Group R-3 and R-4 Occupancies Only	0.40	0.58	0.20	R-38	R-30	R-21	R-21	R-10	R-30	R-10
	V.	Unlimited Group R-1 and R-2 Occupancies Only	0.35	0.58	0.20	R-38 / U = 0.031	R-30 / U = 0.034	R-21 / U = 0.060	R-15	R-10	R-30 / U = 0.029	R-10

- Nominal R-values are for wood frame assemblies only or assemblies built in accordance with Section 601.1.
- Minimum requirements for each option listed. For example, if a proposed design has a glazing ratio to the conditioned floor area of 13%, it shall comply with all of the requirements of the 15% glazing option (or higher). Proposed designs which cannot meet the specific requirements of a listed option above may calculate compliance by Chapters 4 or 5 of this Code.
- Requirement applies to all ceilings except single rafter or joist vaulted ceilings. 'Adv' denotes Advanced Framed Ceiling.
- Requirement applicable only to single rafter or joist vaulted ceilings.
- Below grade walls shall be insulated either on the exterior to a minimum level of R-10, or on the interior to the same level as walls above grade. Exterior insulation installed on below grade walls shall be a water resistant material, manufactured for its intended use, and installed according to the manufacturer's specifications. See Section 602.2.
- Floors over crawl spaces or exposed to ambient air conditions.
- Required slab perimeter insulation shall be a water resistant material, manufactured for its intended use, and installed according to manufacturer's specifications. See Section 602.4.
- Int. denotes standard framing 16 inches on center with headers insulated with a minimum of R-10 insulation.
- This wall insulation requirement denotes R-19 wall cavity insulation plus R-5 foam sheathing.
- Doors, including all fire doors, shall be assigned default U-factors from Table 10-6C.
- Where a maximum glazing area is listed, the total glazing area (combined vertical plus overhead) as a percent of gross conditioned floor area shall be less than or equal to that value. Overhead glazing with U-factor of U=0.40 or less is not included in glazing area limitations.
- Overhead glazing shall have U-factors determined in accordance with NFRC 100 or as specified in Section 502.1.5.
- Log and solid timber walls with a minimum average thickness of 3.5" are exempt from this insulation requirement.

**\* If you selected option I, II or III you will need to complete the Glass to Floor Area Worksheet to show the glazing percentage does not exceed the option selected.**

### GLAZING AREA: Glass to Floor Area Worksheet (Required for Options I, II and III only.)

**Glazing** is defined as all areas, including the frames, in the shell of a conditioned space that let in natural light including windows, clerestories, skylights, sliding or swinging glass doors and glass block walls.

**Glazing Area** is defined as the total area of the glazing measured using the rough opening, and including the glazing, sash and frame. For doors where the daylight opening area is less than 50 percent of the door area, the glazing area is the daylight opening area. For all other doors, the glazing area is the door area.

**Doors** whose area and U-factor are included in the calculations for glazing area may be installed with a U-factor in accordance with the Glazing U-factor requirements instead of the door U-factor requirements.

**Exempt Door:** One unlabeled or untested exterior swinging door with the maximum area of 24 square feet may be installed for ornamental, security, or architectural purposes and need not be listed below.

**Overhead glazing** (skylights) with a U-factor of U- 0.40 or less need not be listed below.

**Single glazing** for ornamental, security, or architectural purposes and double glazed garden windows with a wood or vinyl frame may be exempted from the U-factor limitations, but if so, it shall have its area tripled in list below. The maximum area (before tripling) allowed for the total of all single glazing and garden windows in 1% of the floor area.

**Step 1:** List the rough opening size of all glazing areas as defined above and calculate their total area.

[illegible]

### Step 2:

Enter the square footage of Conditioned Floor Area (heated and/or cooled space)	(b)
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**Step 3:** Calculate the Glazing percentage by dividing the total Glazing Area by the Conditioned Floor Area and multiplying by one hundred:

$$\frac{\text{Glazing Area (a)}}{\text{Conditioned Floor Area (b)}} = \frac{\quad}{\quad} \times 100 = \frac{\quad}{\text{Glazing Percentage}}$$

**In order to use option I, the glazing percentage cannot exceed 12%.**

**In order to use option II, the glazing percentage cannot exceed 15%.**

**In order to use option III, the glazing percentage cannot exceed 25%.**

## WHOLE HOUSE VENTILATION USING THE PRESCRIPTIVE METHOD

Purpose: We have all heard about office and school buildings which cause people to become ill. If improperly ventilated, our homes can cause some of us to become ill too. With all of the new materials we use to construct and furnish our buildings, it is very important that our homes are ventilated in such a way as to provide us with method to get the stale air out and fresh air in.

**Please check the appropriate box to describe which of the four prescriptive Whole House Ventilation Systems you will be using, and fill in any blanks or boxes under the system you choose.**

- ☐ **Option 1.** Whole house Ventilation Using Exhaust Fans (VIAQ 303.4.1)
- \_\_\_\_\_ CFM Exhaust Fan Flow Rating Per Table 3-2 (attached). Location of whole house exhaust fan(s) must be shown on the plans.
  - Fan Controls: 24 hour clock timer with capability of continuous operation, manual and automatic control & accessible
  - Whole house fans located 4 feet or less from the interior grille shall have a sone rating of 1.5 or less at 0.1 inches w.g.
  - Outdoor Air shall be distributed to each habitable room by individual Outdoor Air inlets.  
*Exception:* Exhaust only ventilation systems do not require outdoor air inlets if the home has a ducted forced air heating system that communicates with all habitable rooms and the interior doors are undercut a minimum of ½ inch.

- ☐ **Option 2.** Whole house Ventilation Integrated with a Forced Air Heating System (VIAQ 303.4.2)
- \_\_\_\_\_ inch Fresh air duct, connected to the furnace return plenum, sized Per Table 3-5 (attached)
  - Fresh Air inlet duct Damper Selection: **(Choose one)**
    - ☐ Motorized Damper (no testing of ventilation flow rates as long as the prescriptive duct sizing per Table 3-5 are met.
    - ☐ Manual Damper meeting Table 3-2 flow rates: \_\_\_\_\_ CFM (see attached Table 3-2)
    - ☐ Automatic Flow-Regulated Device per VIAQ 030.4.2.1 #3. (Requires field testing or calculation.)
  - Outdoor Air inlets shall be screened or otherwise protected from entry by leaves or other material and located per VIAQ 303.4.2.4
  - All Ventilation supply ducts in the conditioned space shall be insulated to a minimum of R-4 (VIAQ 303.4.2.3)

- ☐ **Option 3.** Whole house Ventilation Using a Supply Fan (VIAQ 303.4.3)
- \_\_\_\_\_ inch Outdoor air inlet duct, connected to the furnace supply air stream, sized Per Table 3-6 (attached)
  - Fresh Air inlet duct Back-draft Damper Selection: **(Choose one)**
    - ☐ Calibrated manual volume damper installed and set to meet the measured flow rates in Table 3-2 (attached) by field testing with a pressure gauge and/or following manufacturer's installation instructions.
    - ☐ A manual volume damper installed and set to meet the measured flow rates specified in Table 3-2 by field testing with a flow hood or flow measuring station.
    - ☐ An automatic flow-regulating device sized to the specified flow rate in Table 3-2 which provides constant flow over a pressure range of 0.20 to 0.60 inches water gauge.
  - Outdoor Air inlets shall be screened or otherwise protected from entry by leaves or other material and located per VIAQ 303.4.3.6
  - All Ventilation supply ducts in the conditioned space shall be insulated to a minimum of R-4 (VIAQ 303.4.3.5)

- ☐ **Option 4.** Whole house Ventilation Using a Heat Recovery Ventilation System (VIAQ 303.4.4)
- All duct work in heat recovery system shall be at least 6 inches in diameter
  - Balancing dampers shall be installed on the inlet and exhaust side.
  - Flow measurement grids shall be installed on the supply and return.
  - System minimum flow rating shall not be less than specified in Table 3-2. Maximum rates in Table 3-2 do not apply.
  - Outdoor air inlets shall be screened or otherwise protected from entry by leaves or other material and located per VIAQ 303.4.4.4
  - Ventilation Supply Ducts in the conditioned space upstream of the heat exchanger shall be insulated to a minimum of R-4 (VIAQ 303.4.4.3)



### THE FOLLOWING ARE REQUIRED IN ADDITION TO THE OPTION CHOSEN ABOVE:

- At the time of final inspection, the automatic control time shall be set to operate the whole house fan for at least 8 hours per day,
- A label shall be affixed to the control that reads **"Whole House Ventilation"** (see operating instructions)
- 24-hour clock timer installed with capability of continuous operation, manual and automatic control, readily accessible.
- Installer shall provide the manufacturer's installation, operating instructions, and a whole house ventilation system operation description.

## REFERENCE TABLES

**Table 3-2: Ventilation Rates for all Group R Occupancies four stories and less \***

Minimum and Maximum Ventilation Rates: Cubic Feet per Minute (CFM)

Floor Area, ft <sup>2</sup>	Number of Bedrooms													
	2 or less		3		4		5		6		7		8	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
< 500	50	75	65	98	80	120	95	143	110	165	125	188	140	210
501-1000	55	83	70	105	85	128	100	150	115	173	130	195	145	218
1001-1500	60	90	75	113	90	135	105	158	120	180	135	203	150	225
1501-2000	65	98	80	120	95	143	110	165	125	188	140	210	155	233
2001-2500	70	105	85	128	100	150	115	173	130	195	145	218	160	240
2501-3000	75	113	90	135	105	158	120	180	135	203	150	225	165	248
3001-3500	80	120	95	143	110	165	125	188	140	210	155	233	170	255
3501-4000	85	128	100	150	115	173	130	195	145	218	160	240	175	263
4001-5000	95	143	110	165	125	188	140	210	155	233	170	255	185	278
5001-6000	105	158	120	180	135	203	150	225	165	248	180	270	195	293
6001-7000	115	173	130	195	145	218	160	240	175	263	190	285	205	308
7001-8000	125	188	140	210	155	233	170	255	185	278	200	300	215	323
8001-9000	135	203	150	225	165	248	180	270	195	293	210	315	225	338
> 9000	145	218	160	240	175	263	190	285	205	308	220	330	235	353

- For residences that exceed 8 bedrooms, increase the minimum requirement listed for 8 bedrooms by an additional 15 CFM per bedroom. The maximum CFM is equal to 1.5 times the minimum

**Table 3-3: Prescriptive Exhaust Duct Sizing**

Fan Tested CFM @ 0.25" W.G	Minimum Flex Diameter	Maximum Length (feet)	Minimum Smooth Diameter	Maximum Length Feet	Maximum Elbows <sup>1</sup>
50	4 inch	25	4 inch	70	3
50	5 inch	90	5 inch	100	3
50	6 inch	No Limit	6 inch	No Limit	3
80	4 inch <sup>2</sup>	N.A.	4 inch	20	3
80	5 inch	15	5 inch	100	3
80	6 inch	90	6 inch	No Limit	3
100	5 inch <sup>2</sup>	N.A.	5 inch	50	3
100	6 inch	15	6 inch	No Limit	3
125	6 inch	15	6 inch	No Limit	3
125	7 inch	70	7 inch	No Limit	3

- For each additional elbow subtract 10 feet from maximum length
- Flex ducts of this diameter are not permitted with fans of this size.

**Table 3-5: Prescriptive Integrated Forced Air Supply Duct Sizing**

Required Flow (CFM) Per Table 3-2	Minimum Smooth Duct Diameter	Minimum Flexible Duct Diameter	Maximum Length <sup>1</sup>	Maximum Number of Elbows <sup>2</sup>
50-80	6"	7"	20'	3
80-125	7"	8"	20'	3
115-175	8"	10"	20'	3
170-240	9"	11"	20'	3

- For lengths over 20 feet increase duct diameter 1 inch
- For elbows numbering more than 3 increase duct diameter 1 inch.

**Table 3-6: Prescriptive Supply Fan Duct Sizing**

Supply Fan Tested at 0.40" W.G.		
Specified Volume from Table 3-2	Minimum Smooth Duct Diameter	Minimum Flexible Duct Diameter
50 – 90 CFM	4 inch	5 inch
90 - 150 CFM	5 inch	6 inch
150 – 250 CFM	6 inch	7 inch
250 – 400 CFM	7 inch	8 inch

## SOURCE SPECIFIC VENTILATION (VIAQ 302.2)

Source specific exhaust ventilation is required in each kitchen, bathroom, water closet, laundry room, indoor swimming pool, spa, and other rooms where excess water vapor or cooking odor is produced. Source specific ventilation systems must be controlled by a manual switch, de-humidistat, timer or other approved means. Controls must be readily accessible. Ducts must terminate outside the building. Exhaust ducts which are designed to operate intermittently must be equipped with back-draft damper. All exhaust ducts in unconditioned spaces must be insulated to a minimum of R-4. Terminal elements must have at least the equivalent net free area of the duct work. Terminal elements for exhaust fan duct systems must be screened or otherwise protected from entry by leaves or other material.

**Table 3-1: Minimum Source Specific Ventilation Capacity Requirements**

	Bathrooms	Kitchens
Intermittently operating	50 cfm	100 cfm
Continuous operation	20 cfm	25 cfm

**Please be sure to note the locations of your source specific fans on your construction drawings and include the cfm rating you plan to install.**

## MOISTURE CONTROL (WSEC 502.1.6)

In order to help prevent moisture from collecting within the framing of the building, a vapor retarder must be installed to minimize vapor movement through what is called the diffusion process. Components of the house requiring a vapor retarder are:

- Floors between heated and unheated spaces.
- Walls – on the inside (warm side in winter)
- Ceilings averaging less than 12 inches of ventilated area above the insulation to the underside of the roof sheathing.

**Check the appropriate boxes to indicate which method of interior vapor retarder will be used to meet Moisture Control requirements:**

LOCATION	MATERIAL				
	Exterior Grade Plywood or OSB	Backed Batts <sup>1</sup>	4 – Mil Clear Plastic <sup>2</sup>	Vapor Retarder Paint (1.0 perm rating)	Not required if ventilation space average 12" above insulation
Floors		N/A	N/A		N/A
Walls	N/A				N/A
Ceilings	N/A				

- <sup>1</sup> Backed batts at walls and ceilings must be faced stapled. (Paper should extend over studs or rafters towards interior heated space)
- <sup>2</sup> Plastic is to be applied on the interior face of studs, ceiling joists, and rafters. (This does not replace the requirement for 6-mil black polyethylene (plastic) to be laid over the ground within crawl spaces.

## PRESCRIPTIVE HEATING SYSTEM SIZING

Heating and cooling design loads for the purpose of sizing HVAC systems are required and calculations in accordance with accepted engineering practice, including infiltration and ventilation must be provided when plans are submitted for the building permit.

**EXCEPTION: Design heat load calculations are not required to be submitted if the heating system installed is equal to or less than 20 Btu/h\*ft<sup>2</sup>.**

**If you plan to use this exception please complete the following calculation.**

Heated floor area \_\_\_\_\_ x 20 = \_\_\_\_\_ Btu/h\*ft<sup>2</sup> (maximum heating appliance rating)

**Please note that if the heating equipment you actually install exceeds the value calculated in this table, the building inspector may require that you provide design head load calculations prior to field approval.**

**For more information on the WSEC or VIAQ visit: [http://www.energy.wsu.edu/code/code\\_support\\_2003.cfm](http://www.energy.wsu.edu/code/code_support_2003.cfm)**